Claims

What is claimed is:

1. An actuator, comprising:

a piezoelectric device operable receive an activation signal and to displace in a first direction for a first predetermined distance as a function of the activation signal, and operable to displace in a second direction as a function of a change in temperature of the piezoelectric device;

a stop located a second predetermined distance from the piezoelectric device, the stop operable to prevent the displacement of the piezoelectric device in the second direction beyond a third predetermined distance; and

a charge redistributing device coupled with the piezoelectric device, the charge redistributing device operable to redistribute charge on the piezoelectric device due to the temperature change to relieve an internal electric field of the piezoelectric device due to temperature induced deformation of the piezoelectric device.

2. The actuator of claim 1 wherein the second direction comprises a direction substantially opposite the first direction.

3. The actuator of claim 1 wherein the second direction comprises substantially the first direction.

4. The actuator of claim 1 wherein the change in temperature comprises an increase in temperature.

5. The actuator of claim 1 wherein the change in temperature comprises a decrease in temperature.

6. The actuator of claim 1 wherein the stop is substantially adjacent to the piezoelectric device.

7. The actuator of claim 1 wherein the second predetermined distance is substantially zero.

8. The actuator of claim 1 wherein the charge redistributing device comprises a resistor.

9. The actuator of claim 1 wherein the charge redistributing device comprises a power supply for the piezoelectric device.

10. The actuator of claim 1 wherein the piezoelectric device comprises a first and second electrodes and an electroactive material disposed therebetween, the first and second electrodes operable to receive a charge to establish an electric field across the electroactive material, and wherein the charge redistributing device comprises a conductive path between the first and second electrodes.

11. The actuator of claim 1 wherein the piezoelectric device comprises a piezoelectric actuator.

12. The actuator of claim 1 wherein the piezoelectric device comprises a thermally pre-stressed bender actuator.

13. The actuator of claim 1 wherein the second predetermined distance comprises substantially the third predetermined distance.

14. An actuator, comprising:

a piezoelectric actuator means for receiving an activation signal, for displacing in a first direction for a first predetermined distance as a function of the activation signal, and for displacing in a second direction as a function of a change in temperature of the piezoelectric device;

a stop means, located a second predetermined distance from the piezoelectric actuator means, for preventing the displacement of the piezoelectric actuator means in the second direction beyond a third predetermined distance; and

a charge redistributing means, coupled with the piezoelectric actuator means, for redistributing charge on the piezoelectric actuator means due to the temperature change and to relieve an electric field of the piezoelectric actuator means due to temperature induced deformation of the piezoelectric actuator means.

15. A method for compensating for temperature induced deformation of a piezoelectric device that is operable to displace in a first direction as a function of a change in temperature, comprising:

preventing displacement of the piezoelectric device in the first direction beyond a first predetermined distance; and

redistributing a charge on the piezoelectric device due to the temperature change to relieve internal stresses of the piezoelectric device due to temperature induced deformation.

16. The method of claim 15 wherein the piezoelectric device comprises a piezoelectric actuator.

17. The method of claim 15 wherein the first predetermined distance is substantially zero.

18. The method of claim 15 wherein preventing the displacement of the piezoelectric device comprises placing a physical barrier in a path of displacement of the piezoelectric device.

19. The method of claim 15 wherein preventing the displacement of the piezoelectric device comprises:

coupling a connecting device with the piezoelectric device, the connecting device operable to displace in a second direction as a function of displacement of the piezoelectric device; and

limiting the movement of the connecting device in a second direction.

20. The method of claim 19 wherein the second direction comprises substantially the first direction.

21. The method of claim 15 wherein the piezoelectric device comprises a thermally pre-stressed bender actuator.

22. The method of claim 19 wherein the connecting device comprises a rod having a head end opposite the piezoelectric device and wherein placing a physical barrier in the path of displacement of the connecting device comprises placing a physical barrier in the path of the head end of the rod.

23. The method of claim 15 wherein the internal stresses of the piezoelectric device due to temperature induced deformation comprises an electric field created by the to temperature induced deformation.